

## SECTION 41 2225

### HOIST AND TROLLEYS

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#### LANL MASTER SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the LEM Mechanical POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Information within "stars" is provided as guidance to the author responsible for revising the specification. Delete information within "stars" during editing.

This specification serves as a template. The specification was prepared by an organization operating under a quality assurance program that meets the requirements of 10 CFR 830 (suitable for ML-1 through ML-4 projects). Implementation of this specification requires modification to the specification to meet project-specific requirements. Responsibility for application of this specification to meet project-specific requirements lies with the organization modifying or implementing the specification. The organization modifying the specification shall apply a graded approach to quality assurance based on the management level designation of the project. When this specification is used with nuclear facilities subject to 10 CFR 830, modification to this specification must be performed by an individual or organization operating under a quality assurance program that meets the requirements of that CFR.

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Where appropriate for the application, and where commercial grade items are acceptable, specify item by part number and specification, removing onerous requirements (e.g. actual material test reports for part of a production run of hoists)

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This specification section template was written under the assumption that the subject pieces of equipment will typically be purchased Freight on Board (FOB) LANL. This equipment will typically be installed by site personnel. Note that this carries the risk of having the equipment integrated into the glovebox by site personnel who may not possess specific expertise in this field and may pose subsequent problems in any warranty claims. Consider having manufacturer install equipment. Where on-site installation is part of the vendors scope, add and/or edit sections and content including QA, as appropriate.

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Use of a hoist inside a glovebox presents inherent hazards. Hoist/trolley dead load and rated live load capacity shall be considered in the overall glovebox shell and stand design. Acceptable deflections and stresses must be established by the glovebox designer based upon the performance requirements of the glovebox. Performance requirements of the glovebox may include leak-tightness and structural integrity before/during/after design basis accidents. Consideration shall be given to design basis accident scenarios including dropped loads, swinging loads, and natural phenomenon hazards such as seismic events. See Section 11 5311.08 for guidance on these design elements. Include any engineered safety features required by the results of the analyses in 11608, for example add redundant brakes on hoists if the consequences of a dropped load are severe. Consider locating sensitive equipment out of potential drop zone or consider providing (removable) drop shields. Author is to consider method for preventing load swing of trolleys from impacting glovebox walls, and particularly gloves and windows.

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Author to edit sections 11 5311.10 and 11 5311.12 as appropriate to include evaluating bolted supports of Hoists and Trolley assemblies (add this requirement to torque map sections).

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## PART 1 GENERAL

### 1.1 SUMMARY

- A. Section Includes
  - 1. Design and fabrication of hoists and trolleys used only for installation in gloveboxes
- B. Section Does Not Include
  - 1. Below the Hook Lifting Devices
  - 2. Modifications to existing hoists and trolleys installed in gloveboxes
  - 3. Installation

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Define boundaries of scope with respect to vendor responsibilities.

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- C. Products Supplied But Not Installed Under This Section
  - 1. Hoists and trolleys described in this specification are to be supplied FOB LANL and are installed by LANL.

### 1.2 RELATED SECTIONS

- A. Section 01 3300, Submittal Procedures
- B. Section 01 6000, Product Requirement
- C. Section 11 5311.08, Glovebox Design
- D. Section 11 5311.10, Glovebox Fabrication

### 1.3 REFERENCES AND REGULATORY REQUIREMENTS

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Edit items below to remove codes, specifications, and standards (Items A through H) that do not apply. Items I through N are applicable to most applications.

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- A. 29 CFR 1910, OSHA.
- B. ANSI/ASME B30.16 - Overhead Hoists (Underhung)
- C. ANSI/ASME B30.21 - Manually Lever Operated Hoists
- D. ANSI/ASME HST-1 - Performance Standard for Electric Chain Hoists
- E. ANSI/ASME HST-2 - Performance Standard for Hand-Chain, Manually Operated Hoists
- F. ANSI/ASME HST-3 - Performance Standard for Manually Lever Operated Chain Hoists
- G. ANSI/ASME HST-4 - Performance Standard for Overhead Electric Wire Rope Hoists
- H. ANSI/ASME HST-5 - Performance Standard for Air Chain Hoists
- I. ANSI/ASME HST-6 - Performance Standard for Air Wire Rope Hoists
- J. ASME BPVC, Section IX, Welding and Brazing Qualifications
- K. ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)
- L. ASNT SNT-TC-1A, American Society of Nondestructive Testing, Recommended Practice
- M. AWS D1.1, Structural Welding Code Steel
- N. CMAA-74, Crane Manufacturers Association of America, Specifications for Top Running and Under Running Single Girder Electric Overhead Cranes Utilizing Under Running Trolley Hoist
- O. NFPA 70, National Electrical Code, including Article 610, Cranes and Hoists

### 1.4 SYSTEM DESCRIPTION

#### A. Design Requirements

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Edit items below to remove codes, specifications, and standards that do not apply.

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- 1. Design and fabricate hoist or trolley in accordance with the recommendations of the following:
  - a. ANSI B30.16
  - b. ANSI B30.21
  - c. ANSI/ASME HST-1
  - d. ANSI/ASME HST-2

- e. ANSI/ASME HST-3
- f. ANSI/ASME HST-4
- g. ANSI/ASME HST-5
- h. ANSI/ASME HST-6
- i. ASME NOG-1
- j. CMAA Specification No. 74
- k. OSHA 29 CFR Part 1910
- l. NEC Article 610
- m. And the requirements specified herein.

- 2. Supply Hoist system configured as [trolley, eyebolt, hook, lug] type suspension.

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 CAUTION: Wire rope typically frays in normal service. Do not specify wire rope type devices without considering the possible impacts of glove tears. Decontamination of wire rope is also a potential issue.  
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- 3. Supply Hoist system configured with [chain, wire rope] type lifting member. [Provide wire rope hoist with a minimum of two wraps of rope around the rope drum at lowest operating position.]

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 Consider airflow requirements of proposed system with respect to over pressurization of the glovebox when considering pneumatic systems. Account for system environment (flammable, vacuum, inert) when specifying electrically powered units. Consider brush-less motors for electric units. Take American Glovebox Society (AGS) maximum force recommendations for the configuration into account when specifying hand chain or lever operated hoists.  
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- 4. Supply Hoist system powered by [compressed gas, electricity (specify voltage, phases, frequency), hand chain, lever]. [Supply powered Hoist system with limit switches to stop the hook at the highest and lowest safe position.]
- 5. Supply [single-speed, multi-speed] Hoist system.
- 6. Supply Hoist system [with, without] soft start capability.

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 Note that some brake configurations may generate dust during normal usage.  
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- 7. Supply Hoist system [with, without] brake.

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Note that some standard structural beam sizes are not available in stainless steel, particularly 316 stainless steel. This may affect trolley selection.

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8. Supply trolley system with hard stops at end of travel to prevent over running.

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Note that powered trolleys are usually used with large loads or where precise spotting is required. Take AGS maximum force recommendations for the configuration into account when specifying hand chain manual trolleys.

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Consider possible hazards to windows and gloves from swinging loads when specifying trolley systems, especially powered trolley systems. Consider placement of trolley traverse axis such that windows are not in-line.

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9. Supply Trolley system [powered, manual] by [compressed gas, electricity (specify voltage), hand chain].

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Consider possible entanglement hazards to gloves from power cables, hand chains, or compressed air lines used in trolley systems.

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10. Supply powered Trolley system with [festooned cable, cable reel, tagline].

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Small manual trolleys without brakes are acceptable in some cases, at the discretion of the design agency. Larger trolleys and powered trolleys may require brakes.

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11. Supply Trolley system [with, without] brake.
12. Supply [single-speed, multi-speed] Trolley system.
13. Supply Trolley system [with, without] soft start capability.

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Consider routing of compressed air lines when specifying remote (outside the box) pendant pneumatic Hoist / Trolley systems. Filtering of air lines may be required.

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14. Supply Hoist / Trolley system with [local (inside the glovebox) pendant control, remote pendant control (outside glovebox)].
15. Supply Hoist / Trolley system of Duty Service Classification [specify] as required by [list appropriate specification from section 1.4.A.1 herein].

- B. Supply Hoist / Trolley system and certification meeting the requirements of section 1.4.A.1 and with the following performance requirements:

1. Rated Load: [specify]

2. Lift Speed: [specify]
3. Traverse Speed: [specify]
4. Head room: [specify]
5. Lift height: [specify]

## 1.5 SUBMITTALS

A. Submit the following in accordance with Section 01 33 0, Submittal Procedures:

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 Modify the requirement of the Quality Assurance Plan submittal based on Quality requirements added in section 1.5. If no requirements are added, consider deletion of item 1 below.  
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1. Quality assurance plan with proposal for evaluation against criteria listed in this document.
2. Design data for supplied hoist/trolley.
3. Weld Procedure Specifications and Procedure Qualification Reports prior to fabrication.
4. Certification of previous hoist or trolley installations, including name and address of project and owner.
5. Certified Material Test Reports and Certifications for structural steel, fasteners, welding filler materials, hooks, wire rope, brake/truck assemblies, and forgings and castings.
6. Certifications for all electrical and mechanical components stating manufacturer and type.
7. Certification of required inspection and load testing.
8. Welder certifications in accordance with AWS for all welders who will perform work on the hoist or trolley system.
9. Inspection Test Reports and inspector personnel certifications
10. Manufacturer's assembly, installation, maintenance, and troubleshooting instructions including:
  - a. Name, address and telephone number of nearest authorized service facilities and parts distributor
  - b. Parts lists
  - c. Recommended spare parts

- d. Lubrication requirements and list of lubricants including acceptable substitutes
  - e. Maintenance requirements and schedules for all equipment
  - f. Safety procedures
  - g. Proper operation of all equipment
  - h. Routine maintenance procedures
  - i. Assembly drawings and descriptive literature
  - j. Wiring schematics
11. [Shop Drawings, Catalog Cut sheets]
- a. Structural steel fabrication drawings showing structural members and their connections.
  - b. Hoist or trolley drawings (Plans, Sections and Elevations) showing the location of structural members, trolley equipment, travel of hook. Include clearances, lifting lengths, maximum trolley wheel loads and simultaneous trolley wheel loads.
  - c. Electrical drawings (plans, sections, elevations as required)
  - d. Wiring diagrams identifying electrical equipment and schematic of connections and interconnections of panels and equipment.  
Drawings to include the following:
    - 1) Manufacturer's name
    - 2) Model number
    - 3) Rating
    - 4) Hook-speed/hook-load curves (hoisting and lowering) or motor-speed/ torque and current curves for controllers for hoist motor
    - 5) Motor-speed/ torque and current curves for controllers for trolley travel
12. Evidence of experience applicable to the type of work being performed per requirements of section 1.6.A.
13. Document inspections performed on the hoist or trolley systems during fabrication in a report to LANL.
14. Certified Material Test Reports or Certificates of Conformance for welding filler materials used in the fabrication process in accordance with Section 01330.

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Author to edit following section as appropriate. Submit Shop Drawings for supplied hoist/trolley system if system is a custom unit, or submit catalog cut sheets if unit is off-the-shelf.

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## 1.6 QUALITY ASSURANCE

- A. Manufacturer to be regularly engaged in the manufacture and/or assembly of all components for hoists or trolleys of the type specified for this project.

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Add any appropriate QA requirements as dictated by the Management Level (ML) and function of the device/system, such as NQA-1, 10CFR830.122, ISO-9000.

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## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Section 01 6000, Product Requirements.

## 1.8 PROJECT CONDITIONS

- A. Project Environmental Requirements

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Note any special conditions of service that the hoist/trolley will be exposed to such as but not limited to: high radiation field, explosive/flammable atmosphere, inert gas atmosphere, acid environment, ambient temperature, where high radiation fields are expected, compliance with ASME NOG-1, Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder), section NOG-1141, Radiation, etc.

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## 1.9 WARRANTY

- A. Written 24-month parts and labor warranty. Repair or replace defective materials and workmanship of the hoist or trolley during the warranty period. The warranty will begin at the time of final acceptance of the installation by LANL.
- B. Defective Material and Workmanship is defined to include:
  - 1. Performance below required minimums
  - 2. Abnormal wear considering intensity of use
  - 3. Systems that are not maintainable or accessible for required maintenance
  - 4. Unsafe conditions

## 1.10 MAINTENANCE

- A. Extra Materials
  - 1. [Specify any extra materials or spare parts required, e.g. hooks, load chains, trolley wheel sets, motors, wire ropes, brake assemblies and or parts, control module components, and similar such parts and sub-assemblies.]

## PART 2 PRODUCTS

### 2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

- A. Comply with Section 01 2500, Substitution Procedures.

### 2.2 EQUIPMENT

- A. Label equipment with the following information: Manufacturer, model number, serial number, rated capacity and speed, power source requirements, and pertinent operating and safety information. Provide label on equipment [and provide secondary label for placement on exterior of glovebox by LANL.]

### 2.3 ACCESSORIES

- A. Provide hook [with, without] latch. [Any latch provided must not be spring loaded with the potential to pinch or tear glovebox gloves]
- B. Provide chain hoists with load chain container that has a mesh or similar bottom to prevent accumulation of powders or liquids.

### 2.4 FABRICATION

- A. Fabricate the hoist or trolley in accordance with approved shop drawings and manufacturer's data.
- B. Perform welding and inspection in accordance with ASME Code Section IX.

### 2.5 FINISHES

- A. Refer to Sections 11 5311.08, Glovebox Design and 11 5311.10, Gloveboxes, for acceptable surface finishes for use in a glovebox environment. Certain commercial grade items may be accepted with finishes that do not comply with these specification sections, with prior approval by LANL.

### 2.6 SOURCE QUALITY CONTROL

- A. Functional Testing
  - 1. Test the subject trolley/hoist after installation inside the glovebox, and before commissioning of the glovebox, for the following functions.
    - a. Trolley travel speed and range of motion, unloaded and loaded to capacity
    - b. Hoist speed and range of motion, unloaded and loaded to capacity
    - c. Function of any included switches, stops, overload devices
- B. Test, Inspection
  - 1. Test and inspect subject hoist trolley system for compliance with Code requirements of appropriate references of section 1.4.A.1.
- C. Verification of Performance
  - 1. Test the supplied system for conformance with the performance requirements in section 1.3.B.

- D. Perform all quality control, inspection, testing, and reporting in accordance with this specification and established quality assurance plans.
- E. Quality Control: The manufacturer is responsible for the performance of all inspection requirements at the factory and or place of assembly (off-site assembly only). Perform following inspections:
  - 1. Welding: Prepare a welding procedure for all welding work and inspection in accordance with AWS.

## 2.7 MATERIALS AND CONSTRUCTION

### A. General Requirements

- 1. Provide equipment that is completely deburred and snag free as evidenced by not snagging cheesecloth that is wiped across all exposed areas of the equipment.

### B. Operational Requirements

- 1. Supply hoist with overload cutoff device to prevent overloading of the hoist.

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Consider including end switches where the hoist will be installed into a glovebox with PLC or other interlocks. Where no interlocks can be accommodated, delete the end switch requirement below.  
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- 2. Supply hoist with end switches to prevent overtravel of the hoist and subsequent possible damage to the hoist and possibly the glovebox confinement boundary.

### C. Material Requirements

- 1. Use new materials complying with this specification section and per the ASTM specifications and with the same level of certifications as that required in Section 11 5311.10, Glovebox Fabrication.
- 2. Use stainless steel type [304, 304L, 316 or 316L] to match the glovebox that the system is being installed in.

## PART 3 EXECUTION

### 3.1 ADJUSTING AND REPAIRS

- A. Correct any unsafe conditions disclosed by the inspection and tests prior to shipment to LANL. After completion of any adjustments or repairs, repeat pertinent tests until the hoist or trolley systems are approved by LANL.

## END OF SECTION

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Do not delete the following reference information.  
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FOR LANL USE ONLY

This project specification is based on LANL Master Specification 41 2225 Rev. 0, dated January 6, 2006.